

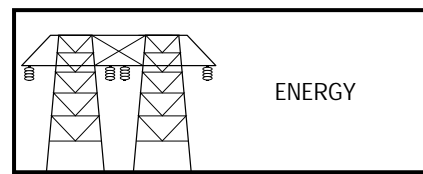
techniques used by fusion researchers for plasma formation and heating, and it is now a major approach for the creation of process plasmas, like the one shown below, generated as part of an ORNL-IBM collaboration. The application of ECH to semiconductor processing at ORNL and PPPL has led to new patents. ASTEX, a company formed by fusion researchers from the Massachusetts Institute of Technology, is now one of the leading suppliers of ECH components and systems to both the research and manufacturing communities.

The development of instruments for monitoring and controlling plasma processes, which are essential to enhancing manufacturing capabilities and efficiency, has benefited from techniques developed in fusion research. Examples include Langmuir probes, microwave interferometry, and plasma spectroscopy. Probe hardware and analytical systems, microwave interferometers, and

plasma reactors are now commercially available from companies such as Plasma and Materials Technologies, Inc. (PMT), which grew out of the fusion research program at the University of California in Los Angeles.

Close integration of physics and technology, long a hallmark of the fusion program, has characterized the development of plasma production techniques. For example, fusion scientists are working to obtain a detailed understanding of the fundamental chemical and physical processes that occur in the plasma and at the location where the plasma interacts with the material surface.

A recent SEMATECH-funded program at Sandia National Laboratories applied a ray-tracing computer code to the analysis of process plasmas. This code was developed by fusion theorists at ORNL as an aid to understanding fusion plasmas heated by ECH.



ENERGY



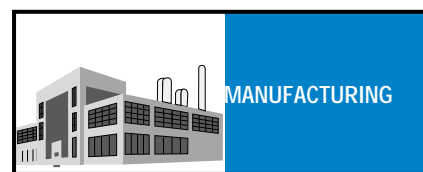
ENVIRONMENT



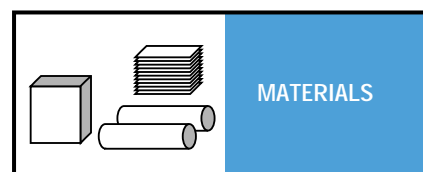
DEFENSE



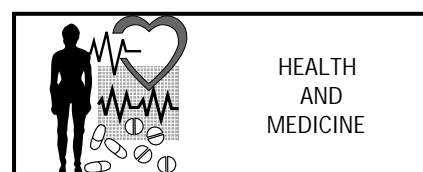
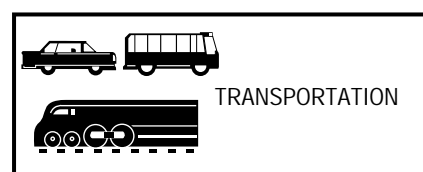
AEROSPACE



MANUFACTURING



MATERIALS

COMPUTING  
AND  
ELECTRONICSHEALTH  
AND  
MEDICINE

TRANSPORTATION

